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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,080	07/15/2003	Ofir Zohar	ASSIA 20.502	7108

26304 7590 10/31/2006

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EXAMINER	
VIDWAN, JASJIT S	

ART UNIT	PAPER NUMBER
2182	

DATE MAILED: 10/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/620,080	ZOHAR ET AL.	
	Examiner	Art Unit	
	Jasjit S. Vidwan	2182	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 23-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 23-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) The invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 5, 6, 7, 8, 9, 10, 23, 24, 27, 28, 29, 30, 31 and 32are rejected under 35 U.S.C. 102(b) as being anticipated by Jacobson et al U.S. Patent no: 5,615,352 **[herein after Jacobson]**.

3. **As per claim 1 and 23**, Jacobson teaches a method for data distribution, comprising:

(a) Distributing logical addresses among an initial set of storage devices so as provide a balanced access to the devices **[Col. 13, Lines 43-46]**.

(b) Transferring the data to the storage devices in accordance with the logical addresses **[Col. 3, Lines 1-5]**;

(c) Adding an additional storage device to the initial set, thus forming an extended set of the storage devices comprising the initial set and the additional storage device **[Col. 13, Lines 53-54]**;

(d) Redistributing the logical addresses among the storage devices in the extended set so as to cause a portion of the logical addresses to be transferred from the storage devices in the initial set to the additional storage device, while maintaining the balanced access **[see Col. 3, Lines 5-13]** and while maintaining the same logical addresses for the logical addresses in the initial set of storage devices that are not transferred to the additional storage device **[see Col. 2, Lines 9-25,** *By moving only the data (logical address) that needs to be transferred to additional storage device, the logical addresses for the data not moved would remain the same in the initial set of storage devices as it was prior to addition of storage devices* **]**.

7. **As per claim 2 and 24**, Jacobson teaches a method, wherein redistributing the logical addresses comprises no transfer of the logical addresses between the storage devices in the initial set **[Col. 2, Lines 16-25]**.

8. **As per claim 5 and 27**, Jacobson teaches a method, wherein at least one of the storage devices comprises a fast access time memory **[see Col. 4, Lines 22-25, "non-volatile storage such as PROM, EPROMS, EEPROMS"]**.

9. **As per claim 6 and 28**, Jacobson teaches a method, wherein at least one of the storage devices comprises a slow access time mass storage device **[see Col. 4, Lines 22-25, "rotating magnetic and optical disks"]**.

10. **As per claim 7 and 29**, Jacobson teaches a method, wherein the storage devices have substantially equal capacities **[Col. 2, Lines 61-63]**, and wherein distributing the logical addresses comprises distributing the logical addresses substantially evenly among the initial set, and wherein redistributing the logical addresses comprises redistributing the logical addresses substantially evenly among the extended set **[Col. 8, Lines 24-30]**.

11. **As per claim 8 and 30**, Jacobson teaches a method, wherein a first storage device comprised in the storage devices has a first capacity different from a second capacity of a second storage device comprised in the storage devices, and wherein distributing the logical addresses comprises distributing the logical addresses substantially according to a ratio of the first capacity to the second capacity, and wherein redistributing the logical addresses comprises redistributing the logical addresses substantially according to the ratio **[Col. 8, Lines 1-5]**.

12. **As per claim 9 and 31**, Jacobson teaches a method, wherein distributing the logical addresses comprises allocating a specific logical address to a first storage device and to a second storage device, the first and second storage devices comprising different storage devices, and wherein storing the data comprises storing a first copy of the data on the first storage device and a second copy of the data on the second storage device **[Col. 1, Lines 37-45, "Mirror Method"]**.

13. **As per claim 10 and 32**, Jacobson teaches a method comprising writing the data from a host external **[Fig. 1, element 16, "Raid Management System"]** to the storage devices **[see Fig. 1,**

Element 11], and reading the data to the external host from the storage devices **[see Fig. 1, elements 11, 14, 16].**

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. Claims 3, 4, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobson et al and further in view of "Consistent Hashing and Random Trees: Distributed Caching Protocols for Relieving Hot Spots on the World Wide Web," by Karger et al., in the Proceedings of the 29th ACM Symposium on Theory of Computing, Pages 654-663 **[herein after Karger]**.

16. **As per claim 3 and 25**, Jacobson teaches limitations of Claim 1, however fails to teach a method wherein distributing the logical addresses comprises applying a consistent hashing function to the initial set of storage devices so as to determine respective initial locations of the logical addresses among the initial set, and wherein redistributing the logical addresses comprises applying the consistent hashing function to the extended set of storage devices so as to determine respective subsequent locations of the logical addresses among the extended set. However, Karger teaches the limitation of a method wherein distributing the logical addresses comprises applying a consistent hashing function to the initial set of storage devices so as to determine respective initial locations of the logical addresses among the initial set, and wherein redistributing the logical addresses comprises applying the consistent hashing function to the extended set of storage devices so as to determine respective subsequent locations of the logical addresses among the extended set **[see Karger, Page 5, Section 4, "Consistent Hashing"]**.

It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to combine the teachings of Jacobson with that of Karger in order to prevent requiring a central server to redistribute a completely updated table to all the machines each time a new machine is added to the network **[see Karger Page 2, Section 1.2]**.

9. **As per claim 4 and 26**, teachings of Jacobson as modified by Karger above teach a method, wherein distributing the logical addresses comprises applying a randomizing function to the initial set of storage devices so as to determine respective initial locations of the logical addresses among the initial set, and wherein redistributing the logical addresses comprises applying the randomizing function to the extended set of storage devices so as to determine respective subsequent locations of the logical addresses among the extended set **[Page 2, section 1.2, "Random Cache Trees"]**.

Response to Arguments

4. Applicant's arguments filed 8/04/2006 have been fully considered but they are not persuasive. Applicant argues prior art fails to teach (I) amended limitation of **"maintaining balance access and while maintaining the same logical addresses for the logical addresses in the initial set of storage devices that are not transferred to the additional storage device,"** and (II) that there is no motivation to combine Jacobson and Karger in respect to rejection of dependent claims 3, 4, 25 and 26.

5. **As per argument I, Examiner disagrees**, As admitted by the Applicant, Jacobson teaches how to distribute all logical addresses across a given set of disks and then, if a disk is added, distributing the logical addresses again. Though, this process results in a "remapped" storage area, the original logical addresses for the initial set of storage devices remain the same because Jacobson teaches that when more storage disks are added, only the data that needs to be moved to the new disk is actually transferred **[See Col. 2, Lines 9-25,** *"When more storage disks are added, data from one stripe is moved to another portion of the physical storage space. The physical storage space containing the stripe is then reconfigured into an expanded stripe for storing data." - By moving only the data that needs to be transferred to additional storage device, the logical addresses for the data not moved would remain the same in the initial set of storage devices as it was prior to addition of storage devices***]**. Due to the above

reasoning, it is the position of the Examiner that Jacobson still reads on the limitations of the amended claim.

6. **As per argument II, Examiner disagrees;** The motivation to combine Jacobson with Karger is valid because Jacobson teaches remapping the logical addresses repeatedly until all RAID areas in hierarchic disk array have been expanded to include regions on the new storage disks. Using Karger's consistent hashing function allows this process to be done more efficiently and thereby not requiring a central server or a user to redistribute all logical addresses each time another RAID disk is added to the system.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jasjit S. Vidwan whose telephone number is (571) 272-7936. The examiner can normally be reached on 8am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KIM HUYNH can be reached on (571) 272-4147. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JSV
10/16/2006

KIM HUYNH
SUPERVISORY PATENT EXAMINER

10/26/06